

Response Under 37 CFR 1.116
Expedited Procedure
Examining Group 3617
Application No. 10/583,703
Paper Dated: January 14, 2009
In Reply to USPTO Correspondence of November 14, 2008
Attorney Docket No. 1455-061783

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

1. (Previously Presented) An apparatus for treating ballast water in a ship, the apparatus comprising:
 - a ballast tank installed in a lower portion of the ship, for storing seawater;
 - an electrolyzer connected with the ballast tank, for electrolyzing the seawater;
 - a first circulation pump installed between the ballast tank and the electrolyzer, for allowing the ballast water to flow into the electrolyzer;
 - a second circulation pump for discharging the electrolyzed seawater containing NaOCl from the electrolyzer to the ballast tank; and
 - a controller controlling a direct-current voltage supply to the electrolyzer and controlling the circulation pumps so as to adjust an NaOCl density of the ballast water.
2. (Previously Presented) The apparatus of claim 1, wherein an NaOCl density detection sensor is installed in at least one position selected among an inside of the electrolyzer, an inlet of the ballast tank and a bottom of the ballast tank.
3. (Previously Presented) The apparatus of claim 1, further comprising valves for controlling inflow and outflow amounts of the seawater installed between the ballast tank and the respective circulation pumps.
4. (Original) The apparatus of claim 3, wherein each of the valves is a solenoid valve.
5. (Original) The apparatus of claim 1, wherein the controller comprises a direct-current voltage supply unit for converting an alternating-current voltage into a direct-current voltage and supplying the direct-current voltage to electrodes of the electrolyzer.

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6. (Previously Presented) A method for treating ballast water in a ship using electrolysis, the method comprising steps of:

taking in seawater into a ballast tank;

operating a circulation pump to allow the seawater of the ballast tank to flow into an electrolyzer where electrodes for electrolysis are installed;

converting, at the electrolyzer, NaCl contained in the seawater into NaOCl through electrolysis;

discharging the seawater containing NaOCl to the ballast tank through a circulation pump;

measuring an NaOCl density to judge whether the NaOCl density reaches a required density;

if the density reaches the required density, stopping the circulation pump; and

if the density does not reach the required density, circulating the ballast water until the density reaches the required density.

7. (Original) The method of claim 6, wherein an NaOCl density detection sensor is installed in order to maintain an NaOCl density constant to control a seawater circulation amount of the electrolyzer or a direct-current voltage supply depending on the detection results.

8. (Cancelled)

9. (Previously Presented) The method of claim 6, wherein the step of measuring the NaOCl density is performed on at least one point among an inside of the electrolyzer, an inlet of the ballast tank and a bottom of the ballast tank.

10. (Original) The method of claim 6, further comprising the step of, after the step of taking in:

judging whether the intake of the seawater is completed using a water-level

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detection device provided to an inside of the ballast tank.

11. (Currently Amended) An apparatus for treating ballast water in a ship, the apparatus comprising:

a ballast tank installed in a lower portion of the ship, for storing ballast water;

an intake pump for taking in seawater and supplying the seawater to the ballast tank so as to use for the ballast water;

an electrolyzer has a body of a cavity shape, positioned between the ballast tank and the intake pump, and both side ends of the body are respectively connected by a pipe extended to the intake pump and the ballast tank, for electrolyzing the seawater supplied to the ballast tank from the intake pump; and

a controller controlling a direct-current voltage supply to the electrolyzer and controlling the intake pump so as to adjust an NaOCl density of the ballast water contained in the ballast tank.

12. (Currently Amended) The apparatus of claim 11, wherein ~~the electrolyzer has a body of a cavity shape and both side ends of the body are respectively connected with a pipe extended from the intake pump to the ballast tank~~ the pipes connect between the ballast tank and the body and between the body and the intake pump in a manner of flange-joining.

13. (Currently Amended) The apparatus of ~~claim 12~~ claim 11, wherein the body is of a cylindrical shape.

14. (Currently Amended) The apparatus of ~~claim 12~~ claim 11, wherein the body of the electrolyzer has a plurality of electrodes consisting of anodes and cathodes arranged in its inside and the electrodes are electrically connected with a direct-current-voltage supply unit so that a direct-current power converted from an alternating current is supplied and electrolysis of the seawater is performed.

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15. (Currently Amended) The apparatus of ~~claim 12~~ claim 11, wherein the pipe uniformly discharges the electrolyzed seawater through a discharge line and a discharge nozzle arranged along a top side of the ballast tank so that the generated NaOCl component is easily diffused inside the ballast tank.

16. (Previously Presented) The apparatus of claim 11, wherein at least one of the ballast tank and the electrolyzer has an NaOCl density detection sensor for detecting an NaOCl density.

17. (Previously Presented) A method for treating ballast water in a ship using electrolysis, the method comprising steps of:

taking in seawater by an intake pump for storing ballast water in a ballast tank;

passing the taken-in seawater through an electrolyzer where electrodes for electrolysis are installed to generate electrolyzed water containing NaOCl;

allowing the electrolyzed water containing NaOCl to flow into the ballast tank;

measuring an NaOCl density from the ballast water in the ballast tank;

controlling the NaOCl density in the ballast water until the density reaches a required density by adjusting supply of a direct-current voltage to the electrolyzer and adjusting an intake amount of the seawater using an intake pump depending on the measuring results.

18. (Cancelled)

19. (Previously Presented) The method of claim 17, further comprising steps of, after the step of controlling the NaOCl density in the ballast water:

judging whether the intake of the seawater is completed using a water-level detection device provided to an inside of the ballast tank; and

operating the intake pump until the seawater reaches a desired intake amount.

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20. (Previously Presented) The method of claim 17, wherein the step of measuring the NaOCl density is performed using an NaOCl density detection sensor positioned in the ballast tank.

21. (Previously Presented) The apparatus of claim 2, further comprising valves for controlling inflow and outflow amounts of the seawater installed between the ballast tank and the respective circulation pumps.